

Free ebook Chapter 8 vectors and parametric equations (PDF)

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a}{v_1} = \frac{y - b}{v_2} = \frac{z - c}{v_3}$ the unit on parametric equations and vectors takes me six days to cover see the following schedule not including a test day i teach on a traditional seven period day with 50 minutes in each class period day 1 graphing parametric equations and eliminating the parameter day 2 calculus of parametric equations finding $\frac{dy}{dx}$ $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ converting from rectangular to parametric can be very simple given $y = f(x)$ the parametric equations $x = t$ $y = f(t)$ produce the same graph as an example given $y = x^2$ the parametric equations $x = t$ $y = t^2$ produce the familiar parabola however other parametrizations can be used parametric equations of a plane rewriting the vector equation of a plane into its x y and z components we get $\mathbf{r} = \mathbf{s}\mathbf{a} + \mathbf{t}\mathbf{b} + \mathbf{e}\mathbf{i} + \mathbf{r}\mathbf{x} + \mathbf{y}\mathbf{z} + \mathbf{x}_0\mathbf{y}_0\mathbf{z}_0 + \mathbf{s}\mathbf{a}_1 + \mathbf{a}_2 + \mathbf{a}_3 + \mathbf{b}_3 + \mathbf{s}\mathbf{t}\mathbf{e}\mathbf{l}\mathbf{r}$ we then see that the parametric equations of a plane are $x = x_0 + sa_1 + tb_1$ $y = y_0 + sa_2 + tb_2$ $z = z_0 + sa_3 + tb_3 + \mathbf{s}\mathbf{t}\mathbf{e}\mathbf{l}\mathbf{r}$ finding vector and parametric equations from the endpoints of the line segment example find the vector and parametric equations of the line segment defined by its endpoints $p(1, 2, 1)$ $q(1, 0, 3)$ to find the vector equation of the line segment we'll convert its endpoints to their vector equivalents the parametric vector form is a method of representing geometric entities like lines and curves using vectors and parameters this form is particularly useful in three dimensional spaces but is applicable to two dimensional spaces as well for a line in space the parametric vector form is given by $\mathbf{r} = \mathbf{t}\mathbf{a} + \mathbf{b}$ where sketching a parametric curve is not always an easy thing to do let's take a look at an example to see one way of sketching a parametric curve this example will also illustrate why this method is usually not the best example 1 sketch the parametric curve for the following set of parametric equations $x = t^2$ $t = 2t$ $1 \leq t \leq 2$ $y = 2 - 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finding the slope of a parametric curve finding the concavity second derivative of a parametric curve finding horizontal and vertical tangents for a parameterized curve calculating area enclosed by a parametric function the purpose of this lab is to introduce you to vector and curve computations for parametric curves and vector valued functions in the plane background vector computations the examples below show how to enter a vector in maple as well as syntax for some of the most basic vector commands

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$x = t^2$ $y = 2t - 1$

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